Cat. No. 22-183

OWNER'S MANUAL

Please read before using this equipment

LCD DIGITAL MULTIMETER

MICRONTA

FEATURES

Your new Micronta LCD Digital Multimeter is a portable 3 $\frac{2}{3}$-digit, compact multimeter ideal for field, lab, shop, bench, and home applications. The meter uses the latest IC and display technology to achieve the lowest possible component count. This makes the meter rugged and easy to use and ensures reliability, accuracy, and stability. The meter also uses two analog-to-digital converters for many special features. Here are some more features that make the multimeter a real *pro*:

- **Conveniently positioned range and function switch knobs for one-hand range/function control**
- **Color-coordinated range and function indications**
- **Effective overload and transient protection on all ranges except the DC/AC 10A range**
- **Continuity function for quick continuity check**
- **Diode check function lets you safely check semiconductor junctions for open, short, or normal**
- **Overrange indication on each range**
- **Full auto-polarity operation**
- **Automatic low-battery detection and indication**
- **Fold-out stand lets you use the meter on a benchtop or hang it on a wall**
- **UL Listed, so it passes the stringent tests required by Underwriter's Laboratories for safety**

© 1992 Tandy Corporation.
All Rights Reserved.
Micronta and Radio Shack are registered trademarks
used by Tandy Corporation.

CONTENTS

A Word About Safety 4
Specifications 6
Special Panel Markings 9
Preparing for Operation 10
- Installing Batteries 10
- Using Test Leads 11
- Using the Stand 12
- Check Before Operation 13

Making Measurements 15
- Measuring DC/AC Voltage 15
- Measuring AC Voltage Riding on a DC Source Bias 17
- Measuring Three-Phase AC Voltages 18
- Measuring DC/AC Current 19
- Measuring Resistance 21
- Using the Continuity Function 24
- Performing a Diode Check 26

Replacing the Fuse 28
Care and Maintenance 30

A WORD ABOUT SAFETY

We have taken every precaution in the design of this meter to ensure that it is as safe as we can make it. However, safe operation depends on you, the operator. We recommend that you follow these simple safety rules:

- Never apply voltages to the meter that exceed the limits given in the specifications. Never apply more than 1000V DC or 750V RMS AC between the input jacks and ground.
- Use extreme caution when you work with voltages above 100V. Always disconnect power from the circuit being measured before you connect test leads to high-voltage points.
- Never connect to a source of voltage when you select the KΩ or diode check function.
- Always discharge filter capacitors before you attach test leads to a power supply.
- Disconnect the test leads and turn off the meter before you replace the batteries or fuse.
- Never operate the meter unless the battery cover is in place and fully closed.
- Since many AC/DC sets have a potentially hot chassis, be sure the top of your workbench and the floor underneath it are made of non-conductive materials.

Your Micronta digital multimeter is fully calibrated and tested. Under normal use, no further adjustment should be necessary. If the meter requires repair, do **not** try to adjust it yourself. Take it to your nearest Radio Shack store. Service by unauthorized personnel voids the warranty.

WARNING: USE EXTREME CAUTION IN THE USE OF THIS DEVICE. IMPROPER USE OF THIS DEVICE CAN RESULT IN INJURY OR DEATH. FOLLOW ALL SAFEGUARDS SUGGESTED IN THE OWNER'S MANUAL IN ADDITION TO NORMAL SAFETY PRECAUTIONS IN DEALING WITH ELECTRICAL CIRCUITS. DO NOT USE THIS DEVICE IF YOU ARE UNFAMILIAR WITH ELECTRICAL CIRCUITS AND TESTING PROCEDURES.

NOT FOR COMMERCIAL OR INDUSTRIAL USE.

SPECIFICATIONS

DC VOLTS

Ranges	Accuracy
300 mV-3-30-300-3000 V (Maximum Measurement = 1000 Volts)	±0.8% of reading and ±0.2% of full scale, ±1 in last digit

AC VOLTS

Ranges	Accuracy
3-30-300-3000 V (Maximum Measurement = 750 Volts RMS at 50/60 Hz)	±1% of reading and ±0.5% of full scale, ±1 in last digit
45 Hz to 500 Hz at 30 Volt Range	±1.5% of reading and ±0.5% of full scale, ±1 in last digit
500 Hz to 10 kHz at 30 Volt Range	±10% of reading and ±0.5% of full scale, ±1 in last digit

DC CURRENT

Ranges	Accuracy
3-30-300 mA; 30 A (Maximum Measurement = 10A)	±1.5% of reading and ±0.2% of full scale, ±1 in last digit

AC CURRENT

Ranges	Accuracy
3-30-300 mA; 30 A (Maximum Measurement = 10A)	±1.5% of reading and ±0.5% of full scale, ±1 in last digit

RESISTANCE

Ranges	Accuracy
300 ohm 3-30-300-3000 kohm	±1.5% of reading and ±0.2% of full scale, ±1 in last digit ± 5 digits maximum at 300-ohm range
30 Megohm	±3% of reading and ±0.2% of full scale, ±1 in last digit

Continuity Function: Continuity buzzer sounds at less than 295 ohms (+/– 20 ohms) input resistance. Buzzer sounds 100 ms — 150 ms (typical) after input is shorted.

Input Impedance ..... 10 Megohms (DCV/ACV)
More than 100 Megohms on 300 mV DC
Range Selection ..... Manual Range
Power Source Four AA 1.5V Batteries, Providing +/– 3V
Power Consumption ..... 10 mW Typical
Low Battery Indication: .... **BATT** on the left of display indicates when + or – supply is below 2.4V – 2.6V.
Polarity ..... Automatic

Overrange Indication: 3000 with blinking **3.** When the measured value exceeds the maximum value, all digits on the display blink.

Operating Temperature ..... 32°F to 122°F (0°C to 50°C)
Storage Temperature ..... – 4°F to 140°F (–20°C to 60°C)
Weight ..... 11.6 oz (330g)
Dimensions ..... 6 $^{11}/_{16}$ x 2 $^{15}/_{16}$ x 1 $^{1}/_{4}$ Inches (170 x 75 x 32 mm)
Accessories ..... Fuse (0.5 A/250 V); Banana-Type Test Leads (Cat. No. 278-704)

SPECIAL PANEL MARKINGS

The meter includes the following markings that remind you of important measurement limitations and safety precautions:

AC/DC AMPS ONLY 10A MAX UNFUSED	The maximum current this meter can measure is DC/AC 10A. The 10A range is not fuse-protected.
750 MAX 	To avoid electrical shock and damage to the meter, do not connect the common input terminal (– jack) to any source of more than 750 V with respect to earth ground.
	Refer to complete operating instructions.
1000V DC 750 V AC 300 mA MAX	The maximum voltage this meter can measure is 1000 V DC or 750 V AC. The maximum current measurement at this terminal is 300 mA.
	Be extra careful when making measurements for high voltage. **Do not touch the terminals or probe ends.**

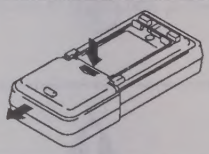
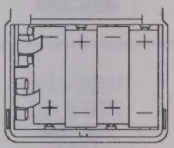
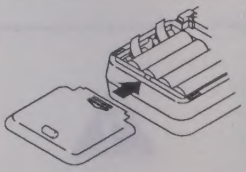
PREPARING FOR OPERATION

INSTALLING BATTERIES

This meter requires four 1.5V AA batteries. We recommend you use alkaline batteries, such as Radio Shack Cat. No. 23-552.

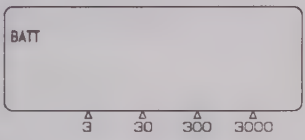
Warning: To avoid electrical shock, be sure the meter's power is off and disconnect both test leads from any equipment before you remove or install the batteries.

Follow these steps to install the batteries:

1. Push the arrow on the battery/fuse compartment cover and slide it in the direction of the arrow.	
2. Snap the batteries in place, according to the polarity symbols marked inside the compartment.	
3. Replace the compartment cover.	

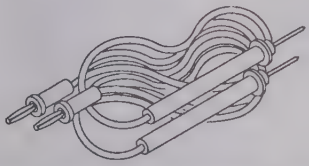
WARNING: DO NOT OPERATE THE METER UNTIL YOU REPLACE THE BATTERIES AND CLOSE THE BATTERY COMPARTMENT COVER.

When the batteries become weak, **BATT** appears on the left side of the display. Replace all the batteries. Never leave weak or dead batteries in the meter. Even leak-proof batteries can leak and damage the meter. When you are not going to use the meter for a few weeks, remove the batteries.



USING TEST LEADS

Use only the type of test leads supplied with the meter. These test leads are rated for 1200 volts. You can buy replacement test leads (Cat. No. 278-704) from your local Radio Shack store.

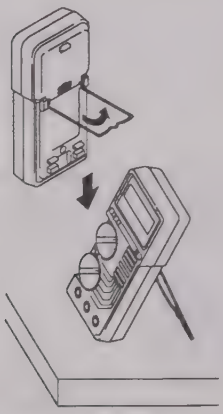


Caution: Although these test leads are rated for 1200 volts, the maximum rating of this meter is 1000 volts DC/750 volts AC. Do not try to measure any voltage more than 1000 volts DC/750 volts AC. Use extreme care when you use high-voltage ranges.

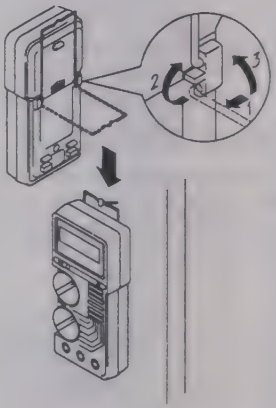
USING THE STAND

The fold-out stand lets you place the meter on a benchtop or hang it on a wall.

Note: To fold the stand upward from the middle position, press in both sides of the stand and remove it from the lower holes. Then, reinsert the stand into the upper holes and fold the stand upward.



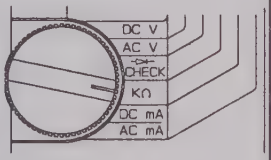
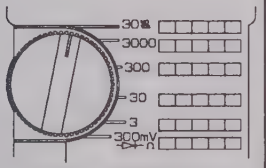
Bench Use



Wall Use

CHECK BEFORE OPERATION

Before you operate the meter, check the following:

1. Set the power switch to **ON**. All the elements of the display briefly turn on as a self-test. Then, the display shows a normal reading.	
2. Set the function switch to **KΩ**.	
3. Turn the range switch, starting at the top (**30 MΩ**). The decimal point on the display should be positioned as described in the chart on the next page.	

Note: In low-voltage ranges, with leads not connected to any circuit, the display might show some *phantom* readings. This is normal and is caused by the meter's high sensitivity and high input impedance. When you connect the meter to a circuit, it displays normal, accurate measurements.

Functions	Range	Display
KΩ	30 Megohm 3000 kohm 300 kohm 30 kohm 3 kohm 300 ohm	dd.dd MΩ dddd kΩ ddd.d kΩ dd.dd kΩ d.ddd kΩ ddd.d Ω
DC V/AC V	3000 V 300 V 30 V 3 V 300 mV (DCV only)	dddd V ddd.d V dd.dd V d.ddd V ddd.d mV
DC mA/AC mA	10 A 300 mA 30 mA 3 mA	dd.dd A ddd.d mA dd.dd mA d.ddd mA
Continuity	320 ohm (Fixed Range)	ddd.d Ω
Diode **CHECK**	3.000 (Fixed Range)	d.ddd

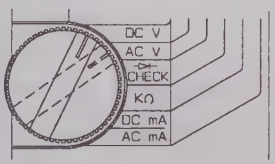
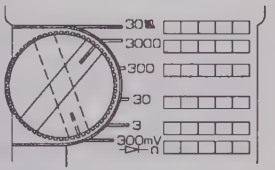
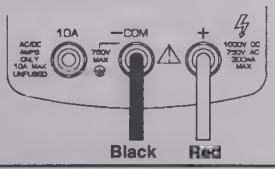
See the measuring unit on the display to determine the range when two ranges have a decimal in the same position. For example, on the 300 mV range, the unit display is mV against V on the 300 V range.

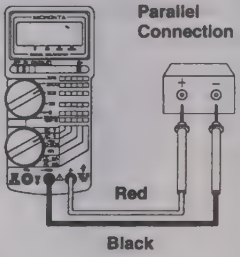
MAKING MEASUREMENTS

MEASURING DC/AC VOLTAGE

WARNING: DO NOT TRY TO MEASURE A VOLTAGE GREATER THAN 1000 V/DC OR 750 V/AC (RMS). YOU MIGHT DAMAGE THE METER AND SUBJECT YOURSELF TO A SEVERE SHOCK HAZARD.

Follow these steps to measure a DC or AC voltage:

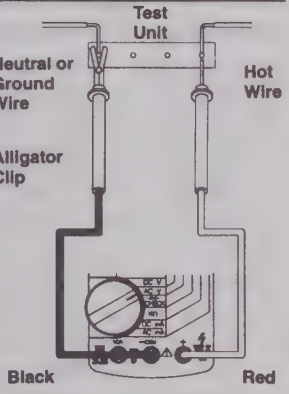
1. Set the function switch to **DC V** or **AC V**.	
2. Set the range switch as required for the voltage level to be measured. If you do not know the voltage level, start with the range switch set to the highest position and reduce the setting as required to obtain a satisfactory reading.	
3. Plug the red lead into the + jack and the black lead into the – **COM** jack.	

4. Touch the probes to the circuit to be tested. For DC voltages, the minus sign appears if the voltage is negative.	
5. Read the range by the position of the decimal point.	

Notes:

- On the 300 V and 300 mV ranges, the decimal point appears in the same position (one place to the left). If you select the 300 mV range, mV appears on the display.
- If you rapidly set the function switch from KΩ to DCV with the range switch set to the 300 mV position, the display might show an overrange indication because of the high input impedance. Short the test leads to remove this condition.
- When measuring DCV or ACV with no circuit under test, the meter might show small fluctuations in the lower ranges. This is normal. The high input impedance produces this wandering effect. When you connect a circuit, the meter performs a normal accurate measurement.

Hint: When you use the meter to probe for a voltage in a high-voltage circuit, we recommend you do not try to position both probes at once. Instead, clamp one of the leads to the neutral or ground lead of the circuit (usually a bare, green, or white lead, in AC wiring circuits) using insulated slip-on alligator clips (Cat. No. 270-354), and then probe for voltages with the other probe. This helps prevent you from accidentally touching a hot wire, since you need concentrate on only one test probe.

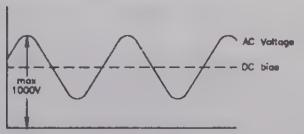


Warning: Never clamp on to a hot wire (usually red, black, or blue in AC wiring circuits). If you do so and then touch the other probe connected to the meter, you could receive an electric shock.

MEASURING AC VOLTAGE RIDING ON A DC SOURCE BIAS

You can measure an AC voltage superimposed on a DC voltage source bias. Set the function switch to AC V.

WARNING: NEVER TRY TO MEASURE ANY CIRCUIT OVER 750V AC WITH RESPECT TO EARTH GROUND.



MEASURING THREE-PHASE AC VOLTAGES

This meter is designed primarily to measure household AC voltage. When measuring 3-phase circuits line-to-line, the value of the voltage is actually higher than the rated line-to-ground 3-phase voltage. It is important that you do not exceed the maximum RMS AC rating of this meter, which is 750V AC. To determine the highest possible voltage on a 3-phase line, multiply the stated voltage by the square root of 3 (approximately 1.75).

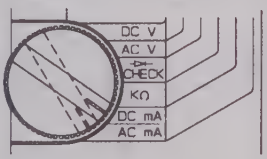
Warnings:

- Severe damage as well as a dangerous shock hazard could result if you connect the meter to a circuit that exceeds the meter's voltage rating.
- Because of the dangers inherent in the measurement of three-phase circuits, we strongly recommend against the use of this meter for such applications.

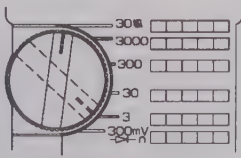
MEASURING DC/AC CURRENT

To measure current, you must break the circuit and connect leads to two circuit connection points. Never connect the leads across a voltage source; doing so will blow the meter's fuse or damage the circuit under test. The maximum input limit for a DC current/AC current measurement is 10A (with the red lead connected to the **10A** jack).

1. Set the function switch to **DC mA** or **AC mA**.



2. Set the range switch to the desired position.



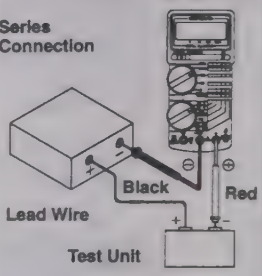
3. For 300 mA max., plug the red lead into the + jack, and the black lead into the – **COM** jack.

   For 10A max., plug the red lead into the 10A jack, and the black lead into the – **COM** jack.

4. Remove power from the circuit under test and then break the circuit at the appropriate point.

5. Connect the probes to the circuit in series.

6. Apply power to the circuit and read the current.

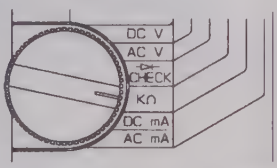
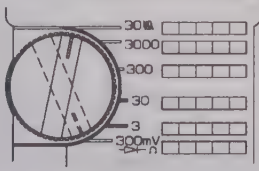
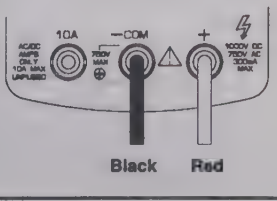


7. If the polarity of the current being measured is negative in DC measurements, the displayed value is preceded by a minus (–) sign (Figure a). Input of more than the maximum rate (DC/AC 10A) causes the display to flash on and off as a warning (Figure b).

Note: All current ranges **except** the 10A range are fuse-protected. If the meter does not operate, check its fuse.

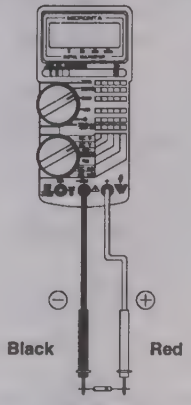
MEASURING RESISTANCE

Note: The resistance measuring circuit compares the voltage which is gained through a known resistance (internal) with the voltage developed across the unknown resistance. Thus, when checking in-circuit resistance, be sure the circuit under test has all power removed. Also, be sure all capacitors are fully discharged.

1. Set the function switch to **KΩ**.	
2. Set the range switch to the desired position.	
3. Plug the red test lead into the + jack and the black lead into the – **COM** jack.	

4. Connect the probes across the circuit to be measured.

   Note: For resistances of about 1 megohm and above, the display might take a few seconds to stabilize. This is normal for high-resistance readings.



Parallel Connection

Use the measuring unit display to see the range you are in. Ω or KΩ distinguishes between the 300-ohm and 300-kohm scales. MΩ or KΩ distinguishes between the 30-megohm and the 30-kohm scales.

Notes:

- Your meter has a circuit to protect the resistance ranges from over-voltage (500V AC for 1 minute). To prevent accidentally exceeding the protection circuit's rating, and to ensure the correct measurement, never connect the probes to a source of voltage when you set the function switch to KΩ or diode **CHECK**.

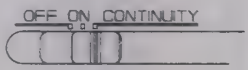
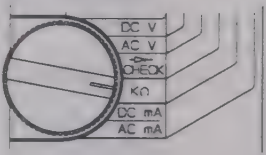
- When you short the test leads in the 300-ohm range, the meter displays a small value (no more than 0.3 ohms). This is due to internal circuit and test lead resistance. You might need to take note of this value and deduct it from the measured value when you measure very small resistances.
- Some devices could be damaged by the current applied during resistance measurements. The table below lists the voltage and current available for each range.

  Note: The A column lists the open circuit voltage at the jacks; the B column lists the voltage across a resistance equal to full scale value; the C column lists the current through a short circuit at the input jacks. All values are typical.

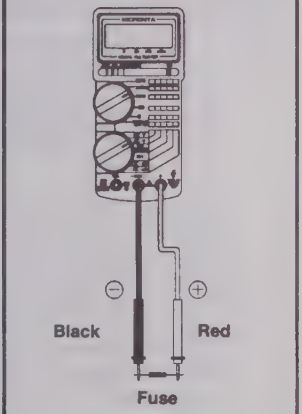
Range	A	B	C
300 ohm	3.0 V	180 mV	700 μA
3 kohm	1.3 V	310 mV	140 μA
30 kohm	1.3 V	400 mV	20 μA
300 kohm	1.3 V	460 mV	2 μA
3000 kohm	0.7 V	440 mV	0.4 μA
30 Mohm	0.7 V	440 mV	0.04 μA

USING THE CONTINUITY FUNCTION

Follow these steps to use the meter's built-in audible continuity function:

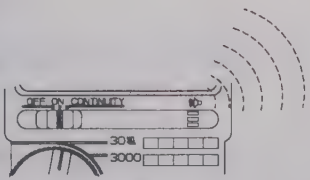
1. Set the power switch to **CONTINUITY**.	
2. Set the function switch to **KΩ**.	
3. Connect the red lead to the + jack and the black lead to the – **COM** jack.	

4. Connect the probes to the circuit you want to check.



Note: When the switch is in the **CONTINUITY** position, the buzzer sounds when:

- The circuit resistance is 300 ohms or less
- The function or range switch setting is changed
- Over-range takes place (except during kohm and diode check functions)

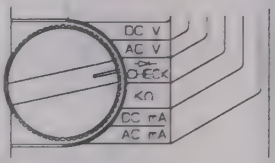


PERFORMING A DIODE CHECK

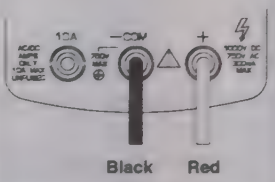
Follow these steps to perform a diode check:

1. Set the function switch to the diode **CHECK** position. The range is automatically set to 3V.

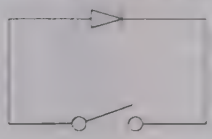
   Caution: Do not connect the test leads to a source of voltage when you set the function switch to the diode **CHECK** position.

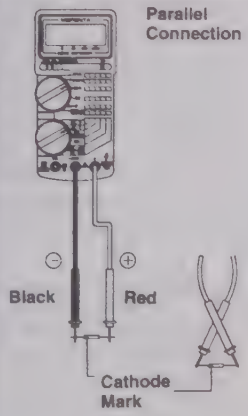


2. Plug the red test lead into the + jack and the black lead into the – **COM** jack.



3. Remove power from the circuit under test.



4. Connect the probe to the semiconductor device you want to check. Connect the red lead's probe to the anode side of the device and the black lead's probe to the cathode side. Note the meter reading.	
5. Reverse the probes and note the second reading. If the first reading shows some value and the second is overrange, the device is open. If the readings are both very small or zero, the device is shorted.	

Note: The values indicated on the display during the diode check operation show the actual forward voltage (maximum 2V). If the value is around 0.400, the device is a germanium type; if it is around 0.600, the device is a silicon type. An LED makes the meter display a value of about 1.800.

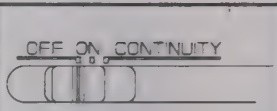
REPLACING THE FUSE

WARNING: TO AVOID ELECTRIC SHOCK, DISCONNECT THE TEST PROBES BEFORE YOU REMOVE THE BATTERIES OR FUSE. REPLACE ONLY WITH THE SAME TYPE OF BATTERIES OR FUSE. THIS METER CONTAINS NO USER-SERVICEABLE PARTS. SERVICE SHOULD BE PERFORMED ONLY BY QUALIFIED PERSONNEL.

CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE, REPLACE ONLY WITH 0.5A, 250V FUSES (Cat. No. 270-1241).

Follow these steps to replace the meter's fuse:

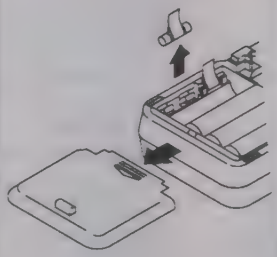
1. Be sure power is off and test leads are disconnected.

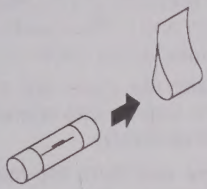
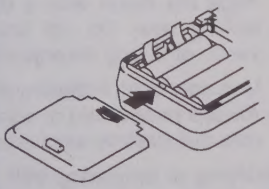


2. Open the battery/fuse compartment cover.

3. Pull the red ribbon in the fuse compartment; the fuse pops out.

   Note: The fuse in the meter is a special size and type. The meter comes with a spare fuse.



4. Insert a new fuse on the ribbon ring. Use only a fuse of the same type/rating (0.5A, 250V, 5 x 20 mm miniature fuse; Cat. No. 270-1241).	
5. Install the new fuse with ribbon in the fuse compartment.	
6. Close the battery/fuse compartment cover.	

WARNING: DO NOT OPERATE THE METER UNTIL THE BATTERY/FUSE COVER IS IN PLACE AND FULLY CLOSED.

CARE AND MAINTENANCE

Your Micronta LCD Digital Multimeter is an example of superior design and craftsmanship. The following suggestions will help you care for the meter so you can enjoy it for years.

- Keep the meter dry. If it does get wet, immediately wipe it dry. Liquids can contain minerals that can corrode the electronic circuits.
- Use and store the meter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries, and distort or melt plastic parts.
- Handle the meter gently and carefully. Dropping it can damage the circuit boards and cause the meter to work improperly.
- Keep the meter away from dust and dirt, which can cause premature wear of parts.
- Wipe the meter with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the meter.
- Use only fresh batteries of the recommended size and type. Always remove old or weak batteries. They can leak chemicals that destroy electronic circuits.

Modifying or tampering with your meter's internal components can cause a malfunction and might invalidate the meter's warranty. If your meter is not performing as it should, take it to your local Radio Shack store. Our personnel can assist you and arrange for service, if needed.

NOTES

RADIO SHACK LIMITED WARRANTY

This product is warranted against defects for 90 days from date of purchase from Radio Shack company-owned stores and authorized Radio Shack franchisees and dealers. Within this period, we will repair it without charge for parts and labor. Simply **bring your Radio Shack sales slip** as proof of purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover a product subjected to misuse or accidental damage.

EXCEPT AS PROVIDED HEREIN, RADIO SHACK MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

We Service What We Sell

RADIO SHACK
A Division of Tandy Corporation
Fort Worth, Texas 76102

811023840A
Printed in Taiwan

6A2